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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/580,556

05/26/2006

Sang Yup Lee

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04/09/2008

INTELLECTUAL PROPERTY / TECHNOLOGY LAW

PO BOX 14329

RESEARCH TRIANGLE PARK, NC 27709

EXAMINER

MEAH, MOHAMMAD Y

ART UNIT

PAPER NUMBER

1652

MAIL DATE

DELIVERY MODE

04/09/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/580,556	Applicant(s) LEE ET AL.	
	Examiner MD. YOUNUS MEAH	Art Unit 1652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 and 32-35 is/are pending in the application.
- 4a) Of the above claim(s) 1,3-7,10-30 and 33-35 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8 and 9 is/are allowed.
- 6) ☒ Claim(s) 2 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/20/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-31, 33-35 are pending. Claims 2, 8-9, 31-32 were examined in the previous action. Claims 1, 3-7, 10-30 and 33-35 remain withdrawn. On 1/23/08, applicant canceled claim 31 and amended claims 2, and 32. Claims 2, 8-9 and 32 will be examined.

Abstract

The abstract of the disclosure is objected to because not submitting in a separate page. Correction is required. See MPEP § 608.01(b).

35 U.S.C 112 Rejection

35 U.S.C 112 2nd paragraph

The 112 2nd paragraph rejections of claims 2 and 32 became moot because of the amendment of the claims.

35 U.S.C 112 1st paragraph Rejection

Rejection of Claims 8-9 under 35 U.S.C. 112, first paragraph is withdrawn after finding applicants' argument and statement persuasive.

Rejection of Claims 2 and 32 under 35 U.S.C. 112, first paragraph Written Description requirement is withdrawn after amendment of the claims and applicant arguments found to be persuasive.

Rejection of Claims 2 and 32 under 35 U.S.C. 112, first paragraph Enablement requirement is withdrawn after amendment of the claims and finding applicant arguments to be persuasive.

CLAIM Rejection - 35 U.S.C 103a

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 32 are rejected under 35 U.S.C. 103(a) by Vemuri et al.(Appld and envrn Microbiol 2002, pp 1715-1727, From IDS) in view of Chang et al. (Appld and envrn Microbiol 1999, pp 1384-1389).

Claims 2 and 32 are drawn to a rumen bacteria selected from *Mannheimia*, *Actinobacillus* or *anaerobiospirillum* wherein genes of *ackA*, *ldhA*, *pfl* and *pta*, enzymes in metabolic carboxylic acid pathway are disrupted in order to enhance the production of succinic acid without producing any other organic acid.

Vemuri et al teaches that lack of *ldhA*, *pfl* in *E. coli* strain NZN111 and *ldhA*, *pfl* and *pta* in *E. coli* strain AFP 111 increase the production of succinic acid as metabolic pathway for production of ethanol, lactate is disrupted. However Vemuri et al does not teach disruption of *ackA* gene and more over said strain shows production of acetate.

Mannheimia, *Actinobacillus* or *anaerobiospirillum* (applicants' amendment page 11) and *E. coli* (Chang et al. (Appld and envrn Microbiol 1999, pp 1384-1389) have identical fermentation pathway for carboxylic acid metabolism. One knowledgeable in prior art knows that disrupting one or other enzyme of a metabolic pathway would disrupt the production of product results from said enzyme (such as disrupting *ldhA* decrease lactic acid production and by doing it enhance production other product such as succinic acid, etc). Chang et al. teach that disrupting *ackA* gene in *E.coli* in addition of disruption of *pta* to increase the production of lactate as metabolic pathway for the production of acetate is disrupted. In other word it is well known in art that disruption of particular pathway enzyme decrease that production of that metabolite. Such as disruption of *ackA* disrupt acetate formation. Disrupting *ldhA* disrupt lactate formation, etc. Therefore, there is a motivation to disrupt *ackA* gene in addition of *ldhA*, *pfl* and *pta* genes in the fermentation pathway for carboxylic acid metabolism of microorganism to disrupt the production of acetate in order further increase the production of succinic acid.

As such it would have been obvious to one of ordinary skill in the art to disrupt *ackA* gene (as taught by Chang et al.) in addition to *ldhA*, *pfl* and *pta* gene in fermentation pathway for carboxylic acid metabolism (as taught by Vemuri et al, since

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rumen bacteria's fermentative pathway are identical to that of *E. coli* in rumen organism comprising *Mannheimia*, *Actinobacillus* or *anaerobiospirillum* as more than likely said mutant bacteria produce more succinic acid without production of other metabolic pathway products including acetate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohammad Meah whose telephone number is 571-272-1261. The examiner can normally be reached on 8:30-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ponnathapu Achutamurthy can be reached on 571-272-0928. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Mohammad Meah/

Acting Examiner of Art Unit 1652/1600

Mohammad Younus Meah, PhD

Examiner, Art Unit 1652

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